Research Secretariat Biennual Review 1978-79 1979-80

Alberta
ENVIRONMENT

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RESEARCH SECRETARIAT
BIENNUAL REVIEW

FOR THE FISCAL YEARS
1978-79 and 1979-80

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INTRODUCTION

Management and protection of Alberta's environmental resources is established under the Department of the Environment Act as the mandate of Alberta Environment. Since its creation in 1971, the Department has established programs and developed legislation related to resource management and pollution control, as a basis for environmental protection. The Department has accepted its responsibility, within government, to ensure that the growth and development of the province can occur while still maintaining a quality of environment acceptable to the people of Alberta. To provide a scientific data base for programs and legislation, the Department has recognized the need for a research support service. As a result, the Research Secretariat was established in 1973 as the research management and administration arm of Alberta Environment. The Secretariat also houses the Departmental Library. Utilizing the skills of some half-dozen scientists, in addition to a Library staff of seven, the Secretariat has developed a research program designed to integrate with and serve the needs of other divisions in meeting their resource management responsibilities.

This report presents highlights of the Research Secretariat's activities over two fiscal years -- 1 April 1978 to 31 March 1979, and 1 April 1979 to 31 March 1980.

Operational Activities

The research strategies developed by Secretariat scientists have had two main objectives: an improvement in the quality of research, and greater success in the incorporation of research results in Alberta Environment's programs and decisions.

Research funded by the Secretariat has been directed to specific environmental problems. The Secretariat has not supported basic research except when it is identified as necessary before applied studies can proceed. Funding has been almost exclusively by contract.

Departmental staff and other scientists have been involved in problem identification and program development for the Secretariat using ad hoc committees. A Secretariat scientist and a departmental staff member who will use the results are usually involved in each project. Wherever possible, projects have been cofunded with other divisions or agencies. Also Secretariat scientists have managed research projects for other divisions. During the past two years Secretariat staff were involved in 100 contracts totalling over $2,225,000, of which only $658,943 was provided from Secretariat funds. Additional funds have been provided by several other divisions and committees. Relevant statistics are shown in the accompanying table.

	1978-79	1979-80
Contracts (Secretariat Funds)	$303,227	$ 355,716
Contracts (Other Sources)	$546,773	$1,144,284+
Grants	$ 35,000	$ 116,635
AERT (direct)	$235,000	$ 238,000

Total Research Monies Managed and Administered by the Research Secretariat (for the fiscal years 1978-79 and 1979-80)

Secretariat scientists have served on many government, academic and industrial research committees, advising on research projects or evaluating projects for funding. Participation in these committees has extended the scope of the Secretariat's management responsibility and maintained a current awareness of environmental research activities in Alberta and at the national level. Moreover, the Chairman of the Secretariat travelled to Ottawa, Toronto and Washington, D.C. to meet with research managers of various programs in government and industry. Staff attended and presented papers at conferences or meetings in various locations in Canada and the United States.

An important aspect of divisional management has been continual development of the expertise and skills of the staff. All scientists attended several conferences or seminars each year, and most participated in management courses. Several prepared research or policy papers, and all initiated and maintained contacts with other scientists to keep abreast of current developments in science and management.

Secretariat scientists annually review 50 to 60 research proposals submitted to or solicited by the Department. Also staff reviewed numerous research and project reports submitted to the Department or committees of which they are members. Scientific advice on resource management has been given formally or informally to other staff when requested.

The Secretariat is responsible for coordinating the development of the Department's research requirements for the Alberta Environmental Centre at Vegreville (AECV), and committees established by Secretariat staff have identified several projects in the air and water systems. The Chairman of the Secretariat represents the Department on the Technical Advisory Committee to the Centre.

Staff have participated in the deliberations of the air, land and water Scientific Advisory Committees of the Alberta Oil Sands Environmental Research

Program (AOSERP). Because Environment Canada withdrew from the Program as of 1 April 1979, a Departmental policy decision was made to integrate the Secretariat and AOSERP on 1 April 1980. This process required considerable effort during the past fiscal year to achieve the desired objective. All staff of both divisions were involved. A management consultant assisted; numerous interdivisional meetings were held; and various planning documents were prepared.

Research Systems

The varied and complex nature of environmental problems or departmental programs has led the Secretariat to develop a systems approach to research management. Without such a structure, it would be extremely difficult to rationally develop projects that provide information on issues which cross the traditional scientific discipline or Departmental divisional boundaries. The Secretariat, as a service division within Alberta Environment, must provide this research capability to all divisions and is cognizant of the diverse interests of managers.

In recognition of the interrelationships which exist within similar biophysical environments, the air, terrestrial and water systems have been identified. The less readily definable system is a fourth one, the human system. It is this latter system which looks at human ecology, environmental perceptions, resource management constructs and other human activities related to environmental matters. Secretariat staff have been hired for their expertise in the biophysical sciences, leaving a gap in the human system.

During the past two years staff have begun to develop concepts and models of each system as a basis for identifying needed areas of research, understanding the scope of each system, and coordinating research projects. Emphasis has been placed on the ecological context of environmental management, and on planning in the development of future Secretariat activities.

Administrative support for the Division is closely tied to the systems, allowing project management to function smoothly from problem identification, through proposal development and project implementation, to termination.

The following sections list the accomplishments related to project management in the various systems. A section on coordination activities follows.

Air System

ACCOMPLISHMENTS IN THE AIR SYSTEM SECTOR

The description and development of an Air System research program that would meet the needs of Alberta Environment was completed (in fiscal year 1978-79), in consultation with environmental managers and scientists in Alberta Environment, in other government departments and agencies, in universities and industry.

Two projects funded by other divisions within the Department were coordinated and managed by the Research Secretariat, for the first time (during fiscal year 1978-79).

Recommendations for an Air System research program for the AECV were formulated by coordinating input from user departments.

Research related to meteorology and air quality over Alberta cities continues. An integrated program of studying the physics, chemistry and meteorology of particulate matter and aerosols over Edmonton and Calgary was initiated. Four research projects have been funded to date, to meet the objectives of this sub-program. It will continue for the next two years.

The Air System Research Manager chaired a National Research Council panel which is writing a scientific criteria document on hydrogen sulphide in the Canadian Atmosphere.

Environmental sulphur research continues to be of high priority. A project on the use of stable sulphur isotopes for environmental monitoring was completed.

To develop a comprehensive research program on Air Quality and Environmental Health, an ad hoc committee was formed in fiscal year 1979-80, with representatives from other government departments, academia and industry. This committee will complete its task by the end of 1980.

The federal government has termed acid precipitation and the long range transport of air pollutants as the primary environmental problem of this decade. Two major air pollutants which contribute to acid precipitation are sulphur oxides and nitrogen oxides. An inventory of industrial sulphur emissions for Alberta was published; a similar inventory for nitrogen oxides' emissions is in preparation.

Technical consultations with Saskatchewan Environment and Environment Canada were initiated recently to assess the regional scale transport of air pollutants in Northeastern Alberta and Northern Saskatchewan. A technical committee, with representatives from these agencies, was established to analyze the problem. This committee is chaired by the Air System Research Manager.

Projects

A Preliminary Study into the Relationships Between Flare Thermal Radiation and Plume Rise.
Funding: $7,200 (fiscal year 1978-79), by Pollution Control, and Standards and Approvals Divisions
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

A Study of the Chemical Composition of Particulate Matter and Aerosols over Calgary.
Funding: $13,600 (fiscal year 1978-79), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Draft report submitted

A Study of the Chemical Composition of Particulate Matter and Aerosols over Edmonton.
Funding: $40,600 (fiscal years 1978-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Draft report due

A Study of the Feasibility of Using Radar Data for Flood Forecasting.
Funding: $5,000 (fiscal year 1978-79), by Research Secretariat and Technical Services
Managed by: Research Secretariat and Technical Services
Administered by: Research Secretariat
Status: Completed

Airborne Particulates and Aerosols Study Over Calgary.
Funding: $27,700 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by:Research Secretariat
Status: Ongoing

Air Pollution Study in the North Saskatchewan River Valley in Edmonton, Alberta.
Funding: $10,500 (fiscal year 1978-79), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Effects of Particulate Pollution on Visual Range over Calgary and Relationship of Particulate Size Distribution to Visibility.
Funding: $49,000 (fiscal years 1978-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Draft report submitted

Field Investigation of the Dispersion of Pollution within an Area of Complex Terrain.
Funding: $45,000 (fiscal year 1978-79), by Alberta Environmental Research Trust and Shell Canada
Managed by: Research Secretariat and Shell Canada
Administered by: Alberta Environmental Research Trust
Status: Completed

Field Study of Plume Rise and Thermal Radiation from Sour Gas Flares.
Funding: $45,000 (fiscal year 1979-80), by Pollution Control, Standards and Approvals; Energy Resources Conservation Board
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Nearing Completion

Injection of Silver Iodide into the Atmosphere of Central Alberta, Resulting from Cloud Seeding Activity.
Funding: $13,478 (fiscal year 1979-80), by Pollution Control and Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Nearing Completion

Sulphur Isotopes in the Environment - Amerada Minerals Flaring Plant near Valleyview.
Funding: $36,049 (fiscal year 1979-80), by Pollution Control
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

The Preparation of Filters for Use in the Collection of Aerosols by Aircraft.
Funding: $4,780 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Publications

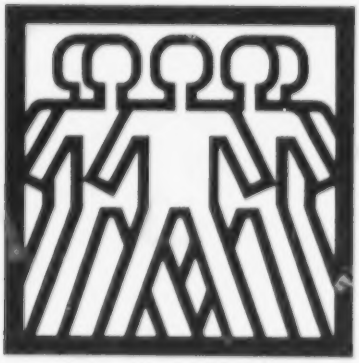
Angle, R.P., H.S. Sandhu and W.J. Schnitzler. "A preliminary field study of nitrogen oxides in the exhaust plume from a compressor installation." Paper 78-26.6. 71st Annual Meeting of the Air Pollution Control Association, Houston, Texas, June 25-30, 1978.

Bottenheim, J.W. and O.P. Strausz. Computer Modelling on Polluted Atmospheres and the Conversion of Atmospheric Sulfur Dioxide to Sulfuric Acid. Report 1978/5. Edmonton: Research Secretariat, Alberta Environment. June 12, 1978.

Hage, K.D. Air Pollution Study of the North Saskatchewan River Valley in Edmonton Alberta. Report 1979/3. Edmonton: Research Secretariat, Alberta Environment. July 1979.

Leahey, D.M., M.C. Hansen and M.J.E. Davies. A Preliminary Study into the Relationships between Thermal Radiation and Plume Rise. Edmonton: Research Secretariat, Alberta Environment. May 1979.

Sandhu, H.S. Industrial Sulphur Emissions for Alberta 1974-1978. Edmonton: Research Secretariat, Alberta Environment. April 1979.



Human System

ACCOMPLISHMENTS OF THE HUMAN SYSTEM SECTOR

The Human System is the sector most recently activated in the Secretariat.

The first Human System Research Manager joined on 1 June 1979. The focus of activity was on the development and refinement of a Human System concept. This set the framework for research in this sector. In-house client groups were identified and four research program areas were developed. They are: 1) social impact assessment, including public participation; 2) environmental education; 3) human-biophysical environmental relationships; 4) research management, policy and implementation.

In the area of social impact assessment, contributions included the organization and co-chairing of a workshop on community impact assessment and serving on the organizing committee for a conference on computer simulation of socioeconomic impacts. The Human System Research Manager spent considerable time as a technical advisor on the social aspects of hazardous waste management. A report on this subject was prepared and an information-sharing session was organized.

Activities in the environmental education area consisted primarily of serving as technical advisor on the evaluation of environmental education. An evaluation package was developed in-house for the Department's pilot program in this area. The program on human-biophysical environment relationships has two subprograms. One is environmental health and has involved representation on committees. The other is environmental attitudes; a pilot survey about environmental attitudes in Edmonton is nearing completion.

The last program area, research management, policy and implementation, includes two studies; one on waste resources management and one on water management policy. Both are cited in the Intersystem Section. Moreover, the Human System Research Manager presented a paper on socio-economic impact analysis at a national conference, on behalf of Environmental Protection Services.

Projects

Edmonton Environmental Survey.
Funding: $2,800 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Nearing completion

Human System Development Project.
Funding: $4,000 (fiscal years 1978-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat (Chairman)
Status: Completed

Public Participation in Energy Resource Regulation: Alberta Thermal Coal.
Funding: $4,000 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Social Criteria for Hazardous Waste Management.
Funding: $5,000 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Socio-Economic Aspects of Surface-Mining for Prairie Coal.
Funding: $400 (fiscal year 1978-79), by Research Secretariat
Managed by: Research Secretariat (Terrestrial System)
Administered by: Research Secretariat
Status: Completed

Publications

Ebel, B.J. Reclamation Costs as an Economic Factor in the Surface Mining of Plains Coal. Edmonton: Research Secretariat, Alberta Environment, 1978.

Krawetz, N.M. Hazardous Waste Management: A Review of Social Concerns and Aspects of Public Involvement. Edmonton: Research Secretariat, Alberta Environment, November 1979.

Krawetz, N.M. "Socio-Economic Impact Analysis. An Alberta Perspective." Presented at the Air Pollution Control Association Second Canadian Government Affairs Seminar, Ottawa, 23-26 September, 1979.

Terrestrial System

ACCOMPLISHMENTS IN THE TERRESTRIAL SYSTEM SECTOR

Reclamation research within the Alberta Department of Environment was coordinated by the Reclamation Research Coordinating Committee, chaired by a Terrestrial System scientist. The interdepartmental Reclamation Research Technical Advisory Committee (RRTAC) became active in May 1978. A Terrestrial System scientist was assigned essentially full-time managerial responsibility for reclamation research in association with the Committee. The Secretariat contributed considerably to the establishment of procedures for the Committee, helping to develop terms of reference, a system of review, a contract format, guidelines for research application and procedure and research priorities. In 1979 RRTAC committed approximately $1.4 million to a reclamation research program with sub-programs in the north-east oil sands region, the coal bearing region of the province's agricultural zone and the mountains and foothills. These contracts are administered by the Research Secretariat and many are managed by a Terrestrial System scientist.

A Terrestrial System Research Manager assisted with the organization of two workshops: (1) Native Shrubs For Reclamation (1978) and (2) Reconstruction of Forest Soils in Reclamation (1980). The scientist was moderator for a discussion group in each workshop.

A Terrestrial System scientist is preparing a review of reclamation research for Alberta. To date a bibliography of some 2500 references has been prepared and over 2000 of these references reviewed.

The Canadian Land Reclamation Association Newsletter was edited by a Terrestrial System Research Manager.

During the past three years, the Chairman and a consultant worked closely with staff in the Pesticides Chemicals Branch of the Pollution Control Division, to develop a comprehensive set of policies for the Branch's operation. Eleven government departments were involved in the process. These policies were submitted for ratification to senior management and the Minister in February 1979.

Policies for biting fly research were developed with the Pesticides Chemicals Branch. Members of the Secretariat have served as scientific advisors to the biting fly research program.

Three general study areas have been identified for more detailed problem analysis:

1) responses of vegetation and soils to industrial and urban pollutants;
2) the role of plants in influencing water quantity and quality yield; and
3) interactions and roles of vegetation and consumer biota in ecosystem dynamics.

A conceptual document describing an ecosystem approach to research into the effects of air pollutants on terrestrial ecosystems has been prepared. The concept pulls together into one coherent program, diverse activities as biomonitoring research and soil response to sulphur deposition into one coherent program.

A Terrestrial System Research Manager assisted as an external member for the University of Alberta in consideration of applicants for the position of Dean of the Faculty of Agriculture and Forestry.

A Terrestrial System Research Manager sat on an ad hoc committee to advise the Petroleum Industry Training Service on the types of new offerings it should consider for the early 1980s.

Projects

Battle River Reclamation Research Project.
Funding: $155,000 (fiscal year 1979-80), by Land Conservation and Reclamation Council (Heritage Trust Savings Fund); Alberta Power; Lusgar Ltd.; Manalta Coal Ltd.
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Chemical Characterization of Bottom and Fly Ash From Alberta Power Stations.
Funding: $5,000 (fiscal year 1979-80), by Land Conservation and Reclamation Council (Heritage Trust Savings Fund)
Managed by: Earth Sciences and Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Evaluation of Bayrock and Reimchen's Surficial Geology and Erosion Potential - Rocky Mountains and the Foothills of Alberta - Surficial Geology Sections.
Funding: $2,000 (fiscal year 1978-79), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Feasibility of Genetic Improvement of Native Alberta Grasses.
Funding: $217,000 (fiscal years 1978-80), Alberta Forest Service;Heritage Trust Savings Fund; Recreation, Parks and Wildlife; Parks Canada
Managed by: Research Secretariat; Alberta Forest Service; Recreation, Parks and Wildlife; Parks Canada
Administered by: Research Secretariat; Alberta Forest Service; Recreation, Parks and Wildlife; Parks Canada
Status: Ongoing

Investigation of Chemical, Physical and Biological Parameters in Stored Topsoil.
Funding: none other than salaries, by Earth Sciences.
Managed by: Earth Sciences and Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Marmot Experimental Watershed Twin Sub Basin Clearcut.
Funding: $100,000 (fiscal year 1978-79), by Research Secretariat, Technical Services Division; Alberta Forest Service; Atmospheric Environment Service; Canadian Forest Service
Managed by: Research Secretariat and Alberta Forest Service (under Alberta Watershed Research Program).
Administered by: Research Secretariat and Alberta Research Council.
Status: Ongoing

Nitrogen Uptake of Native Alberta Grasses.
Funding: $10,000 (fiscal year 1978-79), by Heritage Trust Savings Fund
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Final report in preparation

Oil Sands Soil Reclamation Project.
Funding: $50,000 (fiscal year 1979-80), by Oil Sands Environmental Study Group and Land Conservation and Reclamation Council (Heritage Trust Savings Fund).
Managed by: Combined Government/Industry Steering Committee
Administered by: Research Secretariat
Status: Ongoing

Pesticides Management Policy Project.
Funding: $1,650 (fiscal year 1978-79), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Plant Nutrients, Agronomic Potential of Coal Ash.
Funding: none other than salaries, by Earth Sciences
Managed by: Earth Sciences and Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Plant Nutrients, Agronomic Potential of Fly Ash.
Funding: $7,000 (fiscal year 1978-79), Land Conservation and Reclamation Council (Heritage Trust Savings Fund)
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Post-Development Environmental Impact Assessment of a Resource Development in Alberta.
Funding: $11,000 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Nearing completion

Publication of: Scheichtel, H.M. "Bioengineering for Land Reclamation." University of Alberta, in press.
Funding: $26,200 (fiscal year 1979-80), by Land Conservation and Reclamation Council (Heritage Trust Savings Fund) and Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Nearing completion

Reclamation Afforestation by Suitable Native and Introduced Tree and Shrub Species.
Funding: $85,000 (fiscal year 1979-80), by AOSERP
Managed by: Research Secretariat
Administered by: AOSERP
Status: Ongoing

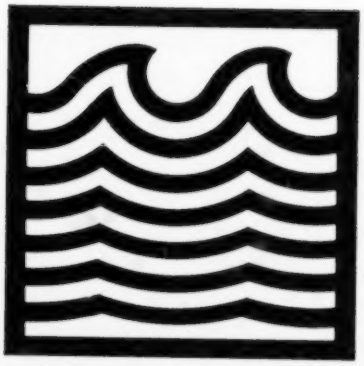
Reclamation Literature Review.
Funding: $70,000 (fiscal years 1978-80), by Land Conservation and Reclamation Council (Heritage Trust Savings Fund)
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Reinstatement of Biological Activity in Devastated Soils.
Funding: $204,800 (fiscal years 1978-80), by Land Conservation and Reclamation Council (Heritage Trust Savings Fund)
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Publications

Sims, H.P. Land Surface Reclamation: An International Bibliography. Edmonton: Research Secretariat, April 1979.

Ziemkiewicz, P.F., C.A. Dermott and H.P. Sims (Eds.). Proceedings. Workshop on Native Shrubs in Reclamation. Edmonton: Reclamation Research Technical Advisory Committee, 1979. No. RRTAC 79-2.



Water System

ACCOMPLISHMENTS OF THE WATER SYSTEM SECTOR

During fiscal year 1978-79, the Water System's Ad Hoc Committee was organized to identify, priorize and coordinate the water related research needs of the Department. As a service, this committee has been very valuable in providing direction and exchanging ideas. It has also provided a mechanism for the identification of projects for the AECV.

Organic contaminants resulting from surface disturbance projects received considerable attention during the past fiscal year. This program involved joint funding with Environment Canada's Inland Waters Branch, to develop techniques which would identify organic contaminants and their sources, using chemical and microbial procedures. Emphasis for this program centred around the Marmot Basin and the Red Deer River.

Two projects were initiated under the general heading of hydrogeology. These dealt with determining the relationship between coal mine reclamation and groundwater.

Six projects related to hydrology were initiated during 1979-80. These concerned flood forecasting in streams, engineering hydrology, sediment loadings and stream mechanics.

Emphasis was directed toward developing and understanding the concepts involved in toxicology, contaminants and biomonitoring. Related projects concerned basic pharmacodynamics of drugs on live tissues, the impact of chlorine originating from an in situ mining process on a freshwater stream, and the utility of macroinvertebrates as indicators of general ecosystem health.

Wastewater treatment was the final program area. Projects dealt with the impact of heavy metals on activated sludge treatment, the biodegradability of polychlorinated-biphenyls in pulpmill sludge, and the health aspects of effluent and sludge disposal.

The Water System conducted three workshops; one dealt with sewage disposal and the other two concerned contaminants, biomonitoring and the presence of organics in the environment.

The Water System research manager presented a paper at the annual Alberta Society of Professional Biologists symposium. The paper outlined an integrated approach to the area of contaminants testing.

Projects

Analysis of Organic Pollutants in Leachate from Edmonton Sanitary Landfill Sites.
Funding: $23,750 (fiscal year 1979-80), by Pollution Control
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Nearing completion

Chlorine Stress Assessment Using a Field Respiration/Community Metabolism Technique
Funding: $5,000 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Cooperative Program in Surface Water Engineering Research.
Funding: $42,650 (fiscal year 1978-79), by Research Secretariat
Managed by: Research Secretariat and Technical Services Division
Administered by: Research Secretariat
Status: Continuing support to the Alberta Research Council

Effects of Exploration Seismograph Activity on Domestic Water Wells.
Funding: $45,674 (fiscal year 1979-80), by Earth Sciences, Research Secretariat; Alberta Energy and Natural Resources
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Nearing completion

(An) Electrophysiological Investigation of the Effects of Toxicants on Fish Skeletal Muscle.
Funding: $8,000 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Environmental Disturbance by Reservoir Development: Biological Indicators for Multi-Use Management.
Funding: $7,500 (fiscal year 1978-79), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Environmental Effects of Coal Mining on Ground Waters at the Whitewood Mine.
Funding: $51,500 (fiscal years 1978-80), by Research Secretariat
Managed by: Earth Sciences and Research Secretariat
Administered by: Research Secretariat
Status: Nearing completion

Fluvial Sediment Transport in the Elbow River.
Funding: $22,910 (fiscal year 1979-80), by Research Secretariat and Technical Services
Managed by: Research Secretariat and Technical Services
Administered by: Research Secretariat
Status: Nearing completion

Grant-in Aid for Water Quality Research: Kananaskis Environmental Research Centre Organic Water Quality in the Marmot Basin and the Red Deer Basin.
Funding: $45,000 (fiscal year 1978-79), by Research Secretariat; Environment Canada
Managed by: Research Secretariat and Environment Canada
Administered by: Research Secretariat and Environment Canada
Status: Ongoing

Hydrogeologic Effects of Coal Strip Mining in Whitewood Area, Alberta.
Funding: $110,000 (fiscal year 1978-79), by Calgary Power; Earth Sciences and Licensing Division and Research Secretariat
Managed by: Calgary Power; Earth Sciences and Licensing Division and Research Secretariat
Administered by: Calgary Power; Earth Sciences and Licensing Division and Research Secretariat
Status: Completed

Maximum Possible Flood.
Funding: $15,000 (fiscal year 1978-79), by Technical Services Division
Managed by: Technical Services Division
Administered by: Research Secretariat
Status: Ongoing

Microbial Ecology of the Red Deer River, Alberta.
Funding: $20,500 (fiscal year 1978-79), by Research Secretariat; Environment Canada
Managed by: Research Secretariat and Environment Canada
Administered by: Research Secretariat and Environment Canada
Status: Ongoing

Mutagenicity and Chemical Composition of Organic Materials in Leachates from a Landfill Site.
Funding: $20,966 (fiscal year 1979-80), by Pollution Control
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Sanitary Landfill Research Program.
Funding: $52,070 (fiscal year 1979-80), by Pollution Control and Research Secretariat
Managed by: Pollution Control
Administered by: Research Secretariat
Status: Ongoing

Spring Runoff from Prairie Streams as Influenced by Climatological and Physiographic Conditions.
Funding: $15,000 (fiscal year 1979-80), by Technical Services
Managed by: Research Secretariat and Technical Services
Administered by: Research Secretariat
Status: Ongoing

(The) Significance of Heavy Metals to the Activated Sludge Process.
Funding: $18,000 (fiscal year 1979-80), by Research Secretariat and Standards and Approvals
Managed by: Research Secretariat and Standards and Approvals
Administered by: Research Secretariat
Status: Ongoing

Support for Groundwater Quality Research.
Funding: $300 (fiscal year 1978-79), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Walleye Studies in the Peace Athabasca Delta.
Funding: $50,000 (fiscal year 1978-79), by Research Secretariat; Department of Fish and Wildlife
Managed by: Research Secretariat and Department of Recreation, Parks and Wildlife
Administered by: Research Secretariat and Department of Fisheries and Wildlife
Status: Completed

Publications

Beltaos, S. A Strain Energy Criterion for Failure of Floating Ice Sheets. Canadian Journal of Civil Engineering. 1978 (5Canadian Journal of Civil Engineering. 1978 (5,3), 352-361.

Beltaos, S. Field Investigations of River Ice Jams. Proceedings of the International Association for Hydraulic Research Symposium on Ice Problems. Lulia, Sweden. 7-9 August 1978.

Beltaos, S. Field Studies on the Response of Floating Ice Sheets to Moving Loads. Presented at the Workshop on the Bearing Capacity of Ice Covers, Winnipeg, 16-17 October 1978.

Beltaos, S. and M.D. Anderson. Mixing Characteristics of the North Saskatchewan River Below Edmonton. Part 1. Edmonton: Alberta Cooperative Research Program in Transportation and Surface Water Engineering. January 1979. No. SWE-79/01.

Beltaos, S. and A.W. Lipsett. An Empirical Analysis of the Creep of Floating Ice Sheets. Presented at the Workshop on the Bearing Capacity of Ice Covers, Winnipeg, 16-17 October 1978.

Doyle, P.F. and D.D. Andres. 1978 Breakup in the Vicinity of Fort McMurray and Investigation of Two Athabasca River Ice Jams. Edmonton: Alberta Cooperative Research Program in Transportation and Surface Water Engineering. December 1978. No. SWE-78/05.

Doyle, P.F. and D.D. Andres. 1979 Spring Breakup and Ice Jamming on the Athabasca River near Ft. McMurray. Edmonton: Alberta Cooperative Research Program in Transportation and Surface Water Engineering. October 1979. No. SWE-79/09.

Doyle, P.F. and J.H. Thompson. North Saskatchewan River - Channel Geometry, Barrymoore Ferry to Edmonton, and Recent Regime Changes, Bighorn Dam to Edmonton. Edmonton: Alberta Cooperative Research Program in Transportation and Surface Water Engineering. August 1979. No. SWE-79/07.

Hammond, B.A. "Biological Issues in Energy Development. The Grade One Reader for the Water System Relative to Energy Development in Alberta." Presented at the Alberta Society of Professional Biologists Symposium on Biological Issues in Energy Development, Calgary, April 1979.

Kristensen, J. Walleye Studies in the Peace - Athabasca Delta, 1978. Edmonton: Research Secretariat, April 1979.

Lipsett, A.W. and S. Beltaos. Tributary Mixing Characteristics Using Water Quality Parameters. Edmonton: Alberta Cooperative Research Program in Transportation and Surface Water Engineering. July 1978. No.SWE-78/04.

Lipsett, A.W. and C.J. Montgomery. Dynamic Structural Response of a Massive Pier. Edmonton: Alberta Cooperative Research Program in Transportation and Surface Water Engineering. September 1979. No. SWE-79/08.

Martz, L.W. The Sediment Yield of Spring Creek Watershed. Report 1978/3. Edmonton: Research Secretariat, Alberta Environment. 1978.

Ridgeway, T.P. Data Report - Channel Characteristics of Red Deer River Prior to Construction of Dickson Dam. Edmonton: Alberta Cooperative Research Program in Transportation and Surface Water Engineering. January 1980. No. SWE-80/05.

Intersystem

INTERSYSTEM ACCOMPLISHMENTS

Secretariat scientists chaired an interdepartmental ad hoc committee which developed a research program on sulphur in Alberta's soils and vegetation. Two projects were initiated. Activities of this committee led to the formation of an interdepartmental government/industry committee to recommend research projects concerning the effects of acid gases in the environment. The industries represented are: oil and gas; heavy oil; and electric power generation. This committee is chaired by a Terrestrial System scientist.

A Terrestrial System scientist served on the Steering Committee for an international invitational Air Quality Workshop held during May 1980. The conference emphasized research and monitoring methods, and ecosystem effects.

Air pollution impacts on vegetation have been a primary activity.

A literature review on sulphur research in Alberta was completed and published.

The Secretariat was responsible for developing and managing (on behalf of Environmental Protection Services) a project which is examining the Department's waste management strategies for the 1980s. Secretariat staff have been involved with research on sanitary landfills, one component of waste management, for several years in association with the Earth Sciences Division. Three such projects were coordinated with the Earth Sciences and Pollution Control Divisions.

The Chairman initiated several discussions on environmental research management. Discussions on this topic were held with staff of the Manitoba Department of Natural Resources and Environment. The Chairman spent two weeks in Ottawa and Toronto discussing environmental research management and science policy with members of the federal and provincial governments, private consultants and the Science Council. A three-day trip to Washington, D.C. was organized for similar reasons.

The Chairman represented the Department at a two-day interprovincial meeting (in Ottawa) to discuss transboundary environmental issues. He also organized and chaired a session on environmental effects of energy developments at the Chemical Institute of Canada Conference in Vancouver.

The Chairman participated in an interagency forum oriented toward developing a strategy to assess socio-economic and environmental effects of mega-developments such as energy projects. This forum subsequently became a responsibility of another department.

During fiscal year 1979-80, the Alberta Research Council prepared a major planning document; this was reviewed within the Department and the final analysis was prepared by the Secretariat.

Projects

A Baseline Study of $^{34}S/^{32}S$ Ratio in the Source and the Environment of Gas Plants in the Peace River Area.
Funding: $12,000 (fiscal year 1978-79), by Standards and Approvals Division
Managed by: Research Secretariat (Air System)
Administered by: Research Secretariat
Status: Completed

Assessment of Reclamation Potential and Hydrologic Impacts of Large-Scale Surface Mining of Coal in Plains Areas of Alberta.
Funding: $750,000 (fiscal year 1979-80), by Land Conservation and Reclamation Council (Heritage Trust Savings Fund)
Managed by: Research Secretariat (Terrestrial System)
Administered by: Research Secretariat
Status: Ongoing

Biogeochemistry of Organic Compounds in Water Quality: Impact of Coal Operations.
Funding: $45,000 (fiscal year 1979-80), by Land Conservation and Reclamation Council (Heritage Trust Savings Fund)
Managed by: Research Secretariat (Terrestrial System)
Administered by: Research Secretariat
Status: Ongoing

Environmental Effects of Coal Mining on Ground and Surface Waters in Alberta.
Funding: $25,000 (fiscal year 1978-79), by Earth Sciences Division and Research Secretariat
Managed by: Research Secretariat (Water System)
Administered by: Research Secretariat
Status: Nearing completion

Evaluation of Landfill Gas Production.
Funding: $20,000 (fiscal year 1978-79), by Earth Sciences and Pollution Control Divisions and Research Secretariat
Managed by: Earth Sciences Division
Administered by: Research Secretariat
Status: Completed.

Landfill Leachate Organic Chemistry Analysis.
Funding: $400 (fiscal year 1978-79), by Research Secretariat
Managed by: Earth Sciences Division
Administered by: Research Secretariat
Status: Completed

Mutagenicity and Chemical Composition of Organic Materials in Leachates from the Clover Bar Landfill Site.
Funding: $25,000 (fiscal year 1979-80), by Pollution Control Division
Managed by: Research Secretariat and Pollution Control Division
Administered by: Research Secretariat
Status: Completed

Nitrogen Oxides Review.
Funding: $35,000 (fiscal year 1978-79), by Canadian Petroleum Association and Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Final report submitted

Preparation of a Map Indicating Sensitivity of Alberta Soils to Sulphur Impingement - Phase I.
Funding: $10,000 (fiscal year 1978-79), by Research Secretariat
Managed by: Research Secretariat (Terrestrial System)
Administered by: Research Secretariat
Status: Completed

- Phase II.
Funding: $52,000 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat (Terrestrial System)
Administered by: Research Secretariat
Status: Ongoing

River Basin Management.
Funding: $11,000 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Waste Resources Management Study.
Funding: $3,689 (fiscal year 1979-80), by Earth Sciences and Pollution Control
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Nearing completion

Publications

Barge, B.L., R.G. Humphries and M.R. Johnson. Weather Radar for Flood Forecasting. Edmonton: Alberta Research Council, March 1980.

MacDonald, W.R. "Environmental Research Management Strategies." Presented at the Alberta Society of Professional Biologists Symposium on Biological Issues in Energy Development, Calgary, April 1979.

MacDonald, W.R. "The Greening of Alberta Environment". Prepared for the Earth Sciences Division, Department of the Environment, February 1979.

Krouse, H.R. and The University of Calgary Interdisciplinary Sulphur Research Group. Isotopes in the Environment. Teepee Creek Gas Plant. Report 1979/1. Edmonton: Research Secretariat, Alberta Environment. November 30, 1978.

R.M. Hardy & Associates Ltd. Report on Sulphur Dioxide Impingement Soil Research. Prepared for Whitecourt Environmental Study Group. Edmonton: May 1978.

Research Secretariat, Alberta Environment. Persons Involved in Environmental Research. Edmonton: November 1978.

Rothwell, R.L. Erosion Control at Stream/Road Crossings, Hinton/Edson, Alberta 1974-75. Staff Report No. 1. Edmonton: Research Secretariat, 1979.

Sandhu, H.S., H.P. Sims, R.A. Hursey, W.R. MacDonald and B.R. Hammond. Environmental Sulphur Research in Alberta: A Review. Staff Report No. 4. Edmonton: Research Secretariat, February 1980.

Smith, S.B. and H.S. Sandhu. "The Alberta Oil Sands Environmental Research Program (AOSERP): An Overview." Presented at the International Conference on the Ecological Impact of Acid Precipitation, Sandefjord, Norway, 11-14 March 1980.

Committees

COMMITTEES

Committees with Secretariat representation are listed below.

Departmental Committees

Ad Hoc Committee - Air System Research Program (Alberta Environmental Centre, Vegreville); Chairperson

Ad Hoc Committee - Air Quality and Environmental Health; Chairperson & Secretary

Ad Hoc Committee on the Water System; Chairperson

Air System Research Committee; Chairperson

Environmental Protection Services Directors/Assistant Deputy Minister Committee

Library Committee

Oxidant/Ozone Regulations Review Committee

Quality Assurance Board, Airshed Management System (AOSERP)

Reclamation Research Coordinating Committee; Chairperson

Research Secretariat Administration and Management Committee

Interdepartmental Committees

Ad Hoc Committee on Sulphur and Soils; Co-Chairpersons

Ad Hoc Committee on Weather Modification (Department of Agriculture)

Air System Scientific Advisory Committee (Alberta Oil Sands Environmental Research Program)

Alberta Fishways

Alberta Watershed Research Program Steering Committee

Aquaculture Committee

Lake Wabamum Scientific Advisory Committee

Land System Scientific Advisory Committee (Alberta Oil Sands Environmental Research Program)

Oil Sands Development and Reclamation Model Study Steering Committee

Reclamation Research Technical Advisory Committee

Research and Development Technical Advisory Committee, Alberta Environmental Laboratory at Vegreville

Water System Scientific Advisory Committee (Alberta Oil Sands Environmental Research Program)

Interagency Committees

Advisory Committee, Faculty of Environmental Design (University of Calgary)

Atmospheric Sciences Advisory Committee (Alberta Research Council)

Environmental Research Advisory Council (Canadian Petroleum Association)

Federal/Provincial Long Range Transport of Air Pollutants (LRTAP) - Scientific Committee (Environment Canada)

Fisheries Subcommittee, Peace Athabasca Implementation Committee.

Forest Development Research Trust Advisory Council

Grants Advisory Committee (Alberta Environmental Research Trust)

Inland Waters Directorate (Environment Canada)

Monitoring Committee, Peace Athabasca Implementation Committee

Native Shrub Research Committee (Oil Sands Environmental Study Group - Reclamation Research Technical Advisory Committee)

Panel on Hydrogen Sulphide in the Canadian Atmosphere - Associate Committee on Scientific Criteria for Environmental Quality (National Research Council); Chairperson

Peace Athabasca Delta Committee (Department of the Environment, Department of Energy and Natural Resources, Environment Canada)

Peace Athabasca Implementation Committee; Secretary

Plains Aquatic Research Group; Secretary

Planning Committee, Conference on Computer Simulation Modelling of Socioeconomic Impacts (University of Alberta)

Policy and Advisory Committee, Kananaskis Centre for Environmental Research (University of Calgary)

Prairie Provinces Water Board

Steering Committee, International Conference. "Air Pollutants and their Effects on the Terrestrial Ecosystem. Current States and Future Needs of Research on Effects and Technologies." Banff, 1980.

Steering Committee on Acid Gases in the Environment (Alberta Petroleum Industry/Government Environmental Committee); Chairperson

Subcommittee on Air - Associate Committee on Scientific Criteria for Environmental Quality (National Research Council)

Surface Water Research Advisory Committee (Alberta Research Council and the Department of the Environment)

Technical Committee - Transboundary Movement of Air Pollutants (Environment Canada, Saskatchewan Environment & Alberta Environment); Chairperson

Technical Advisory Committee, Solar and Wind Energy Research Programs (Alberta Research Council)

Administration

ADMINISTRATION

Considerable progress was made toward consolidation and refinement in the system of financial administration initiated in the fiscal year 1977-78. In particular, budgeting at the "project" or "operations" level was carried out with the assistance of a committee of staff scientists. All budgets were derived from research system coordinating committee requests, based on research needs identified by line divisions.

Contract administration was refined by the institution of assignment-style Master Agreements. The first agreements of this type were concluded with the Universities of Calgary and Alberta, and with the Alberta Research Council. These agreements have succeeded in reducing the red tape necessary to initiate and formalize research projects. As a bonus, they guarantee consistency in terms and conditions amongst the several contracts with a given institution.

Responsibility for administering all research contracts paid from the reclamation research component of the Heritage Trust Savings Fund was given to the Secretariat (in fiscal year 1977-78), including those managed by other Departments.

A number of informal sessions were held with the Administrators for AOSERP and AECV in an effort to maintain comparable procedures and a reasonably uniform approach to research administration in Alberta Environment

A continuing project has been the organization and maintenance of Secretariat files under the Alberta Government Services coding scheme, and mechanization of the coding manual to facilitate updates. It is planned to distribute a revised listing quarterly.

Word processing has become a major component of Secretariat activity. All lists, report drafts and form letters have been entered into the ATMS system to make more efficient use of human resources. Experimental editing techniques have been used in producing the Reclamation Research Bibliography Project and have proven to be cost-effective.

Publication of a bioengineering textbook and surficial geological maps of the foothills and front ranges was pursued to the print stage. Both publications will be released in the new fiscal year, at no further cost to the Secretariat.

Secretariat administrative staff made a number of site visits to become more familiar with field operations by researchers, and to observe laboratory techniques. Site visits for auditing purposes were made to the University of Calgary and the University of Alberta. Recoveries of funds were made in the former case. Spot audits will be continued as standard practice and may be expanded to include all contracts. Guidance in this respect has been requested from Alberta Treasury, Comptroller's Office.

In order to further streamline contract administration, a computer-based project management system was developed with the assistance of Systems and Computing Division and Alberta Government Services (AGS). PC/70, a package already owned by AGS, was evaluated with the assistance of a consultant.

A public relations plan was developed with assistance from the Communications Division. Components of the plan will be instituted in consultation with AOSERP and AECV, to preclude overlap.

In January 1980, integration of activities with AOSERP administrative personnel began in the areas of publication and contract administration. Full integration was achieved by the end of the fiscal year.

Projects

Environmental Research Management System Design.
Funding: $9,000 (fiscal year 1979-80), by Research Secretariat.
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Publication of: Scheichtel, H.M. "Bioengineering for Land Reclamation."". University of Alberta, in press.
Funding: $26,200 (fiscal year 1978-79), by Land Conservation and Reclamation Council and Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Ongoing

Publications

Bayrock, L.A. and T.H.F. Reimchen. Surficial Geology Maps of the Foothills and Front Ranges. (M. Fenton, ed.) Edmonton: Alberta Research Council and Research Secretariat, Alberta Environment, 1979.

Library

LIBRARY

The purpose of the Departmental library is to service the research and reference needs of Departmental staff throughout the province. The library is also open to members of the public who have an interest in the environmental sciences.

The library is responsible for the maintenance and on-going development of an extensive collection of environmental reports and periodicals. At present the library collection holds over 24,000 books and reports, and over 650 journal subscriptions are received throughout the province. Other services include: the ordering of all paid publications, including journals for Departmental staff; the provision of reference and interlibrary loan service; and the development of regional office library service, as required. The main library collection is located in Edmonton; a branch library has been developed for the Calgary regional office; and two office collections exist in Lethbridge. General library service is provided to all Departmental staff located throughout the province.

The library collection was enhanced by the addition of the complete collection of U.S. Environmental Protection Agency reports on microfiche. A subscription in this series has been established to ensure continued access to the most current literature.

Almost 10,000 people used the library during fiscal year 1978-79 and over 13,000 in fiscal year 1979-80. Over these two fiscal years, 6,800 directional and quick reference questions and 170 in-depth reference questions were answered by library staff. Computer searches on specific topics were completed for departmental staff using the library's terminal facilities. Regional offices relied heavily upon the main library collection and services. Interlibrary loan service continued to play an important role in resource sharing; consultants, other government and special libraries, and university and college libraries borrowed materials from the Environment library on a regular basis through this system. In fiscal year 1979-80, regular service to the University of Alberta Library System was reinstated through the instigation of the Alberta Provincial Government Libraries Interlibrary Loan Service.

Demand for library service from both Departmental staff and outside agencies, consultants and other libraries has increased substantially throughout the years. In 1978, a five-year management model was developed to anticipate growth requirements, and to define more accurately future directions in library service. This model has become the basis for future library planning.

Continued growth in demand upon the library's services in the midst of budget and manpower constraints resulted in a review of department-wide library services during fiscal year 1978-79. Participation by Departmental staff in this review provided valuable feedback regarding critical areas of concern. Priorities were established and, based upon feedback from Departmental staff, modifications in library services were effected. At the same time, a critical review of the periodical collection was made, which resulted in almost 60 titles being eliminated.

Access to the Departmental collection was enhanced by the development of subject bibliographies reflecting the library's holdings. These bibliographies were prepared to assist regional staff in their research needs. Topics covered are listed in the following section. A bibliography relating to the Athabasca Oil Sands continues to be updated regularly, and is sent out to individuals on request. It includes more than 1,900 items relating to the socio-economic and environmental aspects of oil sands development.

A closer working relationship was established between the Departmental library and the Technical Services Reference Centre during fiscal year 1978-79. This has promoted accessibility between collections to Departmental and non-departmental staff. Contacts with other special industry and consulting company libraries have developed on a continuing basis, facilitating improved access by Departmental staff to other useful collections.

The University of Alberta Faculty of Library Science Practicum and Grant MacEwan Community College Library Technician program each had a student gaining practical experience in the library.

The library acts on an on-going consultative basis to the developing AECV library. It will be opening in late 1979.

A consultant's report investigated the feasibility of an automated cataloguing, circulation and acquisition system. This study was developed as a cooperative project by the departmental librarians of Agriculture, Energy and Natural Resources, Environment, and the Research Council of Alberta. The development of a shared index or databank of holdings was recommended. Further investigations into the application of such a system are continuing.

Projects

Research Information Systems.
Funding: $4,025 (fiscal year 1979-80), by Research Secretariat
Managed by: Research Secretariat
Administered by: Research Secretariat
Status: Completed

Sci/Tech Data Bank.
Funding: $7,580 (fiscal year 1979-80), by Alberta Environment Library.
Managed by: Sci/Tech Data Bank Committee
Administered by: Alberta Information Retrieval Association
Status: Ongoing

Publications

Fairbrother, C. Management and Organizational Development: A Bibliography. Edmonton: Alberta Environment Library, May 1979.

Gee, S.M. & Moysa, S. "Computerized Bibliographic Information Retrieval in Alberta, Canada: A Review of the Energy/Environment Scene." Paper presented at the Special Libraries 70th Annual Conference. Petroleum and Energy Division Program, Honolulu, Hawaii, 12 June 1979.

Holub, R. A Bibliography of Irrigation in Alberta. Edmonton: Alberta Environment Library, June 1978.

Holub, R. A Bibliography of the Bow River Drainage Basin. Edmonton: Alberta Environment Library, August 1978.

Holub, R. A Bibliography of the North Saskatchewan River Basin. Edmonton: Alberta Environment Library, August 1978.

Holub, R. A Bibliography of the Oldman River Basin. Edmonton: Alberta Environment Library, August 1978.

Holub, R. A Bibliography of the Red Deer River Basin. Edmonton: Alberta Environment Library, August 1978.

Holub, R. A Bibliography of the South Saskatchewan River Basin. Edmonton: Alberta Environment Library, August 1978.

Kennedy, I. An Investigation into the Development of Sci/Tech Data Bank. Edmonton: Library and Information Consultants, October 1979.

Sanford, C. A Bibliography of the Athabasca Oil Sands Fort McMurray, Alberta Area: Socio-economic and Environmental Studies. 1980 Cumulated Update. Edmonton: Alberta Environment Library, January 1980.

Committees

Alberta Government Libraries' Council. Committee to Investigate the Status of Librarians in the Alberta Government (Interdepartmental)

Grant MacEwan Community College Library Technician Program Advisory Committee; Chairperson

Library Committee (Departmental); Chairperson

Sci/Tech Data Bank Committee (Interdepartmental); Chairperson

University of Alberta. Faculty of Library Science. Committee on Accreditation. Subcommittee on Faculty.